

What is claimed is:

Sub a1

1. A non-thermal device for the treatment and/or cure of cardiac arrhythmias.
- 5 2. The non-thermal device of claim 1, wherein the non-thermal device is a photochemotherapy or photodynamic device.

Sub a2

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3. A photochemotherapy or photodynamic therapy device for the ablation of the pulmonary vein ostia.
4. The device of claim 3, wherein the ablation is guided by MRI.

Sub a3

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5. The device of claims 1 through 4, wherein the device includes a high resolution MRI receiver and a fiberoptic laser.
6. The device of claim 4, wherein the high resolution MRI receiver and the fiberoptic laser are housed within a balloon.
7. A device for the treatment and/or cure of cardiac arrhythmias, comprising a catheter having a balloon or reservoir at or near its distal end and a light source located within the balloon or reservoir, whereby a photosensitizing agent is perfused into and delivered by the balloon to a desired treatment site and whereby light capable of activating the photosensitizing agent is delivered by the light source through the balloon and to the desired treatment site.
- 20 7. A device for the treatment and/or cure of cardiac arrhythmias, comprising a catheter having a balloon or reservoir at or near its distal end and a light source located within the balloon or reservoir, whereby a photosensitizing agent is perfused into and delivered by the balloon to a desired treatment site and whereby light capable of activating the photosensitizing agent is delivered by the light source through the balloon and to the desired treatment site.
- 25 8. A photochemotherapy or photodynamic therapy device for the treatment and/or cure of cardiac arrhythmias comprising:
 - a catheter;
 - a balloon at the distal end of the catheter;
 - 30 a fiberoptic laser coaxial with the coil;
 - wherein the fiber illuminates the treatment area.

9. The device of claim 8, wherein the illumination is scattered at the tip of the fiberoptic laser radially through the balloon and into the treatment area.

10. The device of claim 8, wherein a photosensitizing agent is perfused into and
5 delivered by the balloon to a desired treatment site.

Sub A4 11. The device of any one of claims 8 through 10, wherein the fiber provides illumination at a wavelength capable of activating a photosensitizing agent used in the photochemotherapy or photodynamic therapy.

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12. A device for the treatment of cardiac arrhythmias comprising a dual function catheter that combines high-resolution imaging and photochemotherapy or photodynamic therapy

13. A balloon laser device for photodynamic therapy or photochemotherapy, wherein the device further provides high-resolution imaging.

Sub A5 14. The device of claim 13, wherein the high-resolution imaging monitors endpoints of the photodynamic therapy or photochemotherapy.

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15. The device of claim 14, wherein the device further provides intravascular balloon angioplasty.

16. A device for the treatment and/or cure of cardiac arrhythmias that induces
25 apoptotic cell death of tissues and pathways from which abnormal signals arise and/or in other cardiac tissues such that abnormal electrical rhythms can not be generated and/or sustained.

17. A device for the treatment and/or cure of cardiac arrhythmias that uses free
30 radical generation to destroy tissues and pathways from which abnormal signals arise and/or that destroys other cardiac tissues such that abnormal electrical rhythms cannot be generated and/or sustained.

18. A medical device kit, comprising one or more of the devices of any one of claims 1 through 17.

19. The kit of claim 18, wherein the one or more devices are packaged in sterile
5 condition.

Suba 67

20. A non-thermal method for treating and/or curing cardiac arrhythmias.

21. A method for treating and/or curing cardiac arrhythmias using
10 photochemotherapy or photodynamic therapy.

22. A method to electrically isolate the pulmonary vein from the left atrium comprising using photochemotherapy or photodynamic therapy.

23. A method of ablating at least a section of the pulmonary vein using
15 photochemotherapy or photodynamic therapy.

24. A method to treat and/or cure cardiac arrhythmias using photochemotherapy or photodynamic therapy to destroy tissues and pathways from which abnormal
20 signals arise and/or in other cardiac tissues such that abnormal electrical rhythms can not be generated and/or sustained.

25. A photodynamic method for causing cell death in certain cardiac tissue such that abnormal electrical rhythms can not be generated and/or sustained.

26. A method to treat and/or cure cardiac arrhythmias using the device of any one
25 of claims 1 through 17.

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27. A method to treat and/or cure cardiac arrhythmias using photochemotherapy or photodynamic therapy comprising:
delivering a therapeutically effective amount of a photosensitizing agent to the cardiac tissue, wherein the photosensitizing agent is preferentially absorbed by the tissues and pathways from which abnormal signals causing the arrhythmias arise; and
5 activating the photosensitizing agent with an illumination mechanism.
28. The method of claim 27, wherein the step of activating the photosensitizing agent with an illumination mechanism overlaps with the step of delivering a
10 photosensitizing agent to the cardiac tissue.
29. The method of claim 27 wherein the photosensitizing agent is selected from porfimer sodium and phthalocyanines.
- 15 30. The method of any one of claims 21 through 29, wherein the method further comprises guiding the photochemotherapy or photodynamic therapy using MRI and/or x-ray fluoroscopy.
- 20 31. The method of any one of claims 21 through 30, wherein a photosensitizing agent is delivered to the cardiac tissue systemically.
32. The method of any one of claims 21 through 30, wherein a photosensitizing agent is delivered to the cardiac tissue by an angioplasty catheter balloon or reservoir mechanism.
- 25 33. The method of claim 32, wherein the angioplasty catheter balloon or reservoir mechanism has one or more discrete pores through which the photosensitizing agent is delivered to the cardiac tissue.
- 30 34. The method of claim 33, wherein the one or more pores are positioned for delivery to a desired location in the cardiac tissue.

35. The method of claim 32, wherein at least a portion of the angioplasty catheter balloon or reservoir mechanism is fabricated of a semipermeable membrane through which the agent is delivered to the cardiac tissue.

5 36. The method of claim 35, wherein the portion(s) of the angioplasty catheter balloon or reservoir mechanism fabricated of the semipermeable membrane is situated to deliver the photosensitizing agent to a desired location of the cardiac tissue.

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10 37. The method of any one of claims 21 through 30, wherein the photosensitizing agent is delivered to the cardiac tissue by directly perfusing the photosensitizing agent into the coronary arteries.

15 38. The method of any one of claims 19 through 37, wherein the photochemotherapy or photodynamic therapy utilizes an illumination mechanism and the illumination mechanism comprises a fiberoptic catheter.

39. The method of claim 38, wherein the fiberoptic catheter delivers illumination at a discrete point.

20 40. The method of claim 38, wherein the fiberoptic catheter delivers illumination in a linear pattern.

41. The method of claim 38, wherein the fiberoptic catheter delivers illumination in an annular/ring shaped pattern.

25 42. The method of any one of claims 21 through 37, wherein the photochemotherapy or photodynamic therapy utilizes an illumination mechanism and the illumination mechanism comprises a dual function catheter that combines high-resolution imaging and photodynamic therapy.

30 43. The method of claim 42, wherein the dual function catheter comprises a balloon laser device.

44. The method of claim 43, wherein a photosensitizing agent is delivered by the balloon and the laser delivers light capable of activating the photosensitizing agent.

45. The device of any one of claims 42 through 44, further comprising the step of
5 monitoring the endpoints of the photodynamic therapy or photochemotherapy
utilizing high-resolution imaging.

46. The device of any one of claims 42 through 45, dual function catheter further provides intravascular balloon angioplasty

47. The method of any one of claims 21 through 46, further comprising the step of inserting an illumination mechanism into the treatment site and utilizing MRI to guide the illumination mechanism to the treatment site.

48. The method of any one of claims 21 through 47, further comprising the step of utilizing MR imaging to monitor coagulation on the endocardial surface.

49. The method of any one of claims 21 through 48, further comprising the step of utilizing MR imaging to monitor oxygenation levels.

50. The method of any one of claims 21 through 49, further comprising the step of utilizing MR imaging to monitor phosphate levels.

51. A method by which endpoints of photochemotherapy or photodynamic
25 therapy are monitored by MRI and/or x-ray fluoroscopy.

52. A method for treating and/or curing cardiac arrhythmias, comprising administering a therapeutically effective amount of a photosensitizing agent to a patient followed by exposing the patient to light capable of activating the photosensitizing agent.

54. A photodynamic device for causing cell death in certain cardiac tissue such that abnormal electrical rhythms can not be sustained.

Add a 10

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